



Introduction

Road Pricing: Is It Needed, Is It Possible, Is It Inevitable?

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The introduction of cordon charges in large European cities such as London and the pressing budget constraints for infrastructure construction and maintenance (e.g., in Germany) have spurred a renewed interest in the issue of transport pricing. Recent special issues or collection of papers can be found in Schade and Schlag (2003), in Santos (2004), in *Transport Policy* vol. 15, issue 5 (2005) and vol. 13, issue 2 (2006) or in de Palma, Lindsey and Proost (forthcoming), inter alia.

This special issue contains a selection papers presented at the 2nd Kuhmo conference in July 2005, which was held in Kuhmo, Finland.

What is the contribution of this issue to the on-going debate on road pricing? The papers can be subdivided into two categories: a) theoretical papers and b) policy and applied research papers.

A striking characteristic of the literature on road pricing is that the degree of consensus among economist on its beneficial social effects seems to be inversely proportional to its acceptance among the general public and the politicians. Social efficiency and political acceptability instead of going hand-in-hand appear to be moving in opposite directions. Three papers - by *Amihai Glazer* and *Esko Niskanen* (2006), *Andreas Kopp* (2006) and *Edoardo Marcucci, Marco Marini, and Davide Ticchi* (2006) – discuss, at a theoretical level, the reasons why this might occur. The first two papers add the concept of “fairness”, a term including both the concepts of “equity” and “justice”, to the concept of social efficiency, while the third paper deals with the issue of political acceptability of road pricing policies.

Amihai Glazer and *Esko Niskanen* explain the opposition to road pricing schemes through the interpretation road users might have when a congestion toll is perceived as a

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punishment for the damage a user causes on others. In this sense, road pricing is perceived by the road user as “unfair” or “unjust”. The argument assumes that when a user suffers from congestion, he believes that he has already undergone some punishment and thus considers unfair or unjust the payment of an additional toll. Consequently, a person views a congestion toll as unjust if the toll exceeds the difference between the congestion externality a road user generates on others and the uncompensated externality he suffers from others. (Some users may also misunderstand or ignore the concept of externality or user-pay principle). By exploring the implications of such a view and by illustrating how to determine the toll satisfying this criterion of justice it is shown that the socially optimal toll violates this criterion. The authors illustrate how the fair or “just” toll varies with the parameters of the model and discuss the implications of alternative definitions of justice as well as potential extensions of the basic model considered.

Andreas Kopp studies the conflict between allocative efficiency and fairness arising from an optimal decentralized provision of infrastructure services. The author discusses the most prominent principles of fairness, arguing that the reward principle could be considered as the most relevant fairness principle for the discussion of distributional effects of pricing rules. Applying this fairness notion, no conflict of compatibility between allocative efficiency arises in a benchmark case with strong congestion and optimal marginal cost prices, whereas a genuine distributional conflict results in the case of relatively low levels of congestion and heterogeneous users, with the implication of the non-coverage of fixed costs and revenues deriving from imposition of efficient prices.

The paper by *Edoardo Marcucci, Marco Marini, and Davide Ticchi* use the citizen-candidate game framework to analyse the issue of the political acceptability of road pricing policies. The paper asserts that road pricing policies are never applied when there is no redistribution of the resources generated in favour of other modes of transport (public transport) or when the congestion of these types of transport is relatively high. The results suggest that the efficiency of the redistribution of resources from road to the alternative types of transport (public transport) as well as the fraction of the population that uses the road transport provide key factors in explaining the adoption of road pricing schemes

The opening paper of the applied and policy oriented group of papers is written by *Robin Lindsey*. It provides an up-to-date survey of the recent developments and current policy issues in road pricing in the US and Canada. This contribution complements the mostly European perspective of the remaining papers. Although it is difficult to make a comparison between the two continents, it is the author’s opinion that the US and Canada are in a relative delay with respect to Europe and Singapore as for the practical implementation of road pricing schemes. At the same time, however, both countries have demonstrated quite a sustained interest in road pricing considering it an appropriate instrument both for reducing congestion as well as for generating revenues. The interest in road pricing schemes is testified for the US by the funding of the Value Pricing Pilot Program aimed at pricing demonstration projects and for Canada by the undergoing examinations of road charging in order to finance both the construction of new roads as well as the maintenance of old ones.

The paper by *André de Palma, Kiarash Motamedi, Nathalie Picard, and Paul Waddell* follows the strong and growing interest in the development and use of large-scale planning models. It describes the first step of a project aiming at the integration of

UrbanSim, a dynamic micro-simulation land use model, and METROPOLIS, a dynamic traffic model. Such integration, novel in many respects, allows for the treatment of two type of endogeneity in residential location choices: the interdependency between residential location and housing prices as well as the interdependency between residential location and travel times for work and other purposes trips. Such modelling effort allows a more comprehensive long-run (as well as short-run) evaluation of the impact of the road pricing policies since the distribution of commercial and residential activities are treated as endogenous.

Stef Proost, Saskia Van der Loo, André de Palma, and Robin Lindsey approach the issue of road pricing at a more micro level. For this purpose, they analyse a proposal to build a new tunnel under the Scheldt river, near the centre of Antwerp in order to relieve traffic congestion on the ring road and in an existing tunnel. They use a new CBA-economic model, MOLINO, which is briefly summarized. Three tolling schemes on the new infrastructure are compared with the tolling of the existing tunnel without building a new infrastructure. The comparison among the different options is carried out using the MOLINO model, recently developed as part of the European-Union funded REVENUE project. The two tunnels are regarded as imperfect substitutes in a multi-year accounting framework where emissions, accidents, noise externalities, and road damage, revenues accruing to the national and regional governments from existing transport user charges are considered along with the salvage value of the new tunnel. Pricing measures provide an important tool to influence user behaviour. The available ones are numerous and very diversified. The pricing design depends on the objectives pursued and it is therefore important to predict the most likely responses induced by these forms of intervention. Different people have different options to change transport behaviour and this implies different reactions to different pricing schemes. The extant literature on this aspect is somewhat scarce.

Barry Ubbels and Erik Verhoef carried out an empirical research through a questionnaire among Dutch car owners on the impact of road pricing on road users' behaviour. The results indicate that road pricing may have considerable effects, and that much depends on the design of the measure. In terms of trips adjusted, the effectiveness of the measures is in the range of 6% to 15% for all purposes. The effect in terms of kilometres is somewhat smaller. There are considerable differences between trip purposes, with commuting generally being least sensitive when the charge is time independent. The effect of revenue use is obvious in most cases, the measures with revenues allocated to lower income users have generally more impact. Although the decision whether or not to implement a price measure remains a political one, it is clear that the effects depend very much on the type and structure of the measure proposed.

The paper by *Bernhard Wieland* describes a recent and important innovation in European pricing measures: the use of a satellite based tolling system for heavy goods vehicles (HGVs) in Germany. The Author describes the political and economic background of the introduction of the HGV-toll by sketching the history of the implementation process, describing the major structural elements of the toll, and discussing current problems and possible future developments. It is interesting that the major reason for the HGV-toll acceptance seems to have been the existence of a "grand coalition" of actors supporting it including politicians, truckers, environmentalists, the general public, and especially car owners. Each actor had his own motivation in mind while the media concentrated their reporting more on the technical and managerial problems of Toll Collect, the company in charge of the system, rather than on the

economic and social issues linked to it. In conclusion, the author argues in favour of the need to find a binding political mechanisms with respect to the use of the revenues of the toll. Even if it is known from the economic theory of second best that allocating these revenues to road building must not necessarily be the first best option, acceptance might however increase if citizens can be convinced that the toll is not “just another tax.”

Finally, *Alessandra Libardo*, *Silvio Nocera*, and *Dario Trabucco* discuss the merits of pricing for a peculiar purpose: tackling the problems posed and the damages provoked in the lagoon of Venice by the waves originating from boat traffic. Given that most of the traffic is freight transportation the authors concentrate on suggestions pertaining to the re-organization of freight operations and distribution in Venice. The innovative aspect of this paper consists in the adaptation of the road pricing logic to a particularly complex environment where mobility through water canals determines specific forms of externality requiring complex control systems. The pricing has the objective of modifying the *status quo* of the organization of the freight movement in the lagoon, with the aim of introducing the pressure of competition between the operators, who nowadays actually operate in a rather captive market system characterised by little efficiency.

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References

- de Palma, A., Lindsey, R. and Proost, S. (Eds.), (forthcoming) *Investment and the Use of Tax and Toll Revenues in the Transport Sector*. Elsevier, Amsterdam.
- de Palma, A., Motamedi, K., Picard, N. and Waddel, P. (2005) “A model of residential location choice with endogenous housing prices and traffic for the Paris region”, *European Transport \ Trasporti Europei*, 31, pp. 67-82.
- Glazer, A. and Niskanen, E. (2005) “When users of congested roads may view tolls as unjust”, *European Transport \ Trasporti Europei*, 31, pp. 6-14.
- Kopp, A. (2005) “Fairness, efficiency and the simultaneity of pricing and infrastructure capacity choice”, *European Transport \ Trasporti Europei*, 31, pp. 15-27.
- Libardo, A. Nocera, S. and Trabucco, D. (2005) “A new approach for the freight transportation system in Venice”, *European Transport \ Trasporti Europei*, 31, pp. 129-142.
- Lindsey, R. (2005) “Recent developments and current policy issues in the US and Canada”, *European Transport \ Trasporti Europei*, 31, pp. 46-66.
- Marcucci, E, Marini, M. and Ticchi, D. (2005) “Road pricing as a citizen-candidate game”, *European Transport \ Trasporti Europei*, 31, pp. 28-45.
- Proost, S., Van der Loo, S., de Palma, A. and Lindsey, R. (2005) “A cost-benefit analysis of tunnel investment and tolling alternatives in Antwerp”, *European Transport \ Trasporti Europei*, 31, pp. 83-100.
- Santos, G. (Ed.) (2004) *Road Pricing: Theory and Evidence. Research in Transportation Economics 9*. Elsevier, Amsterdam.

- Schade, J., Schlag, B. (Eds.), (2003), *Acceptability of Transport Pricing Strategies* Pergamon Press, New York.
- Transport Policy (2006) Modelling of Urban Road Pricing and its Implementation, Volume 13, Issue 2, pp. 97-176 (March).
- Transport Policy (2005) Road User Charging: Theory and Practices, Volume 12, Issue 5, pp. 373-476 (September).
- Ubbels, B. and Verhoef, E. (2005) "Behavioural responses to road pricing. Empirical results from a survey among Dutch car owners", *European Transport \ Trasporti Europei*, 31, pp. 101-117.
- Wieland, B. (2005) "The German HGV-Toll", *European Transport \ Trasporti Europei*, 31, pp. 118-128.